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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/534,204	03/24/2000	Shinji Imai	Q56555	2972

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EXAMINER	
LEE, SHUN K	

ART UNIT	PAPER NUMBER
2878	

DATE MAILED: 04/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/534,204	IMAI ET AL.	
	Examiner	Art Unit	
	Shun Lee	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,59,62 and 64-69* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,59,62 and 64-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of species I (claims 1-8) in Paper No. 12 has been acknowledged.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-8, 59, 62, and 64-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karellas (US 5,864,146) in view of Perez-Mendez (US 5,596,198) and Takahashi *et al.* (US 5,059,794).

In regard to claims **5-7**, **65**, and **68**, Karellas discloses (Fig. 37) an image read-out system comprising:

(a) a stimulating light source (1302) which emits stimulating light (1310) in a wavelength range of not shorter than 600 nm (column 34, lines 54-63),

(b) a stimulating light scanning means which causes the stimulating light (1310) emitted from the stimulating light source to scan (column 34, lines 54-56) a stimulable phosphor sheet (1306) having a layer of stimulable phosphor which emits stimulated emission in a wavelength range not longer than 500 nm (column 35, lines 1-8) in proportion to the stored energy of radiation upon exposure to the stimulating light (1310),

(c) a solid image sensor (electronic area detector 1312) having a photoconductive material layer the major component of which is a-Se (*i.e.*, amorphous selenium; column 40, lines 1-9) and which exhibits electric conductivity upon exposure to the stimulated emission from the stimulable phosphor sheet (1306), and

(d) an image signal obtaining means (*i.e.*, pixelated readout; column 40, lines 1-9) which detects electric charges generated in the photoconductive material layer of the solid image sensor (electronic area detector 1312) when the stimulable phosphor sheet (1306) is exposed to the stimulating light (1310) and stimulated emission emitted from the stimulable phosphor sheet (1306) impinges upon the photoconductive material layer, and detects an image signal representing an image stored on the stimulable phosphor sheet (1306).

While Karellas also discloses (Fig. 5) that an image sensor comprises pixels disposed in a first direction and a second direction perpendicular to the first direction, wherein the pixels disposed in the first direction are separated by a pixel element pitch, so that each

pixel in the first direction is in a one-to-one correspondence with a picture element and (column 40, lines 1-9) obtaining an image signal by pixelated readout of the amorphous selenium image sensor, the system of Karellas lacks that each pixel comprises of a spaced apart electrode in one-to-one correspondence to each pixel and wherein an electric voltage imparting means which imparts an electric voltage to a 1 μm to 100 μm (or 10 μm to 50 μm) thick photoconductive material layer so as to apply an electric field which generates an avalanche amplification effect in the photoconductive material layer of the solid image sensor during impingement of the stimulated emission. However, pixelated readout of photoconductive image sensors is known in the art. For example, Perez-Mendez teaches (Figs. 2 and 5; column 6, lines 57-67) that a-Se image sensors comprises a rectangular array of spaced apart pixel electrodes. Further, a-Se photoconductive material layer properties are well known in the art. For example, Takahashi *et al.* teach (column 2, lines 18-22 and 47-58; column 7, lines 15-39) to apply an electric field to an a-Se photoconductive material layer (*e.g.*, 2 μm thick; column 6, lines 15-39) sufficient for avalanche amplification in order to increase optical detection sensitivity when using a laser stimulable phosphor. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to apply a sufficient electric field to (*e.g.*, a 2 μm thick) a-Se photoconductive material layer at each spaced apart pixel electrode in the system of Karellas during pixelated readout, in order to increase optical detection sensitivity as taught by Takahashi *et al.*

In regard to claims **1-3**, **62**, **64**, **66**, **67**, and **69**, the method steps are implicit for the modified apparatus of Karellas since the structure is the same as the applicant's apparatus of claims 5-7, 65, and 68.

In regard to claim **4** (which is dependent on claim 1) and claims **8** and **59** (which are dependent on claim 5), the system of Karellas lacks a fluctuation suppressing means that suppresses image signal fluctuations due to fluctuation in the electric field applied to the photoconductive material layer (*e.g.*, by correcting the image signal according to applied electric field fluctuations from voltage power source fluctuations). However, photoconductor quantum efficiency (η) as a function of applied electric field (E) is well known in the art. For example, Takahashi *et al.* (Fig. 3) teach that there is a steep increase in quantum efficiency (η) when the applied electric field (E) increases. In addition it is important to recognize (see for example Eq. 4 of Takahashi *et al.*) that quantum efficiency (η) denotes efficiency for conversion of light (L) into charge (Q). Thus Q is proportional to η which is a function of both L and E and image signal $S = g(Q) = g(h_A(L_E,E)) = f_A(L_E,E)$. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a fluctuation suppressing means (*e.g.*, $S = f_A(L_E,E)$) in the system of Karellas, so that the image signal (S) is indicative of the stimulated emission (L_E) and thus representative of the image stored on the stimulable phosphor sheet.

Response to Arguments

5. Applicant's arguments filed 24 January 2005 have been fully considered but they are not persuasive.

Applicant argues (first paragraph on pg. 11 of remarks filed 24 January 2005) that Karellas teaches away from a scanning light arrangement since Karellas emphasizes the benefits of a flash stimulating light exposure to mitigate dark current during read out, citing column 34, lines 41-51 as support. Examiner respectfully disagrees. While Karellas discloses that a light source which irradiates the entire area of the phosphor have desirable properties, there is no express teaching that a scanning light source such as a laser should not be used. On the contrary, Karellas states (column 34, lines 54-56) that "The storage scintillator can be stimulated by a light source which irradiates the entire area of the phosphor, or by a scanning light source such as a laser". Therefore, Karellas expressly teaches that an alternative means for applying stimulating light is a scanning light source such as a laser.

In response to applicant's argument (last paragraph on pg. 11 of remarks filed 24 January 2005) that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Karellas states (column 40, lines 4-7) that "Electronic area detector 1594 can be a CCD (front or back illuminated), a transparent gate CCD amorphous silicon pixelated plate, or amorphous selenium plate with pixelated readout". Thus Karellas disclose an amorphous selenium plate with pixelated

readout. Karellas does not describe the details of the amorphous selenium plate with pixelated readout. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a known amorphous selenium plate with pixelated readout. Perez-Mendez (Figs. 2 and 5; column 6, lines 57-67) was cited as an example of a known amorphous selenium plate with pixelated readout which comprises a rectangular array of spaced apart pixel electrodes. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a known pixelated readout amorphous selenium plate structure such as the pixelated readout amorphous selenium plate of Perez-Mendez.

In response to applicant's argument (first paragraph on pg. 12 of remarks filed 24 January 2005) that the avalanche amplification of Takahashi *et al.* cannot be incorporated into Karellas, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Moreover, Takahashi *et al.* state (column 2, lines 47-58) that "In a radiation imaging apparatus including a laminate structure consisting of a phosphorescent layer, a first light-transmissive electrode, a photoconductor layer, an insulating layer and a second light-transmissive electrode, the objects of the invention described above can be accomplished by the arrangement wherein a voltage to be applied across the first and second electrodes is increased to a sufficiently high level

and the photons emitted from the phosphorescent material causes avalanche multiplication of the electrons and/or positive holes generated inside the photo-conductor layer by field sweep inside the photoconductor layer". Thus Takahashi *et al.* teach avalanche amplification of electrons and/or positive holes in a photoconductor layer from photons emitted from a phosphorescent material. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to apply a sufficient electric field to (*e.g.*, a 2 μm thick) a-Se photoconductive material layer at each spaced apart pixel electrode in the system of Karellas during pixelated readout, in order to increase optical detection sensitivity as taught by Takahashi *et al.*

Applicant argues (second paragraph on pg. 12 of remarks filed 24 January 2005) that the combination of Karellas and Takahashi *et al.* is improper since Takahashi *et al.* describes recording to a photoconductive layer. Examiner respectfully disagrees. Takahashi *et al.* state (column 7, lines 34-38) that "For instance, though this embodiment utilizes the photoconductor electrode material for the storage portion, the material may be those which can store the X-ray image, and a laser stimulable phosphor material can be used for the storage portion, for example". Therefore Takahashi *et al.* expressly teach recording to a laser stimulable phosphor material.

In response to applicant's argument (last paragraph on pg. 12 of remarks filed 24 January 2005) that the detector of Takahashi *et al.* cannot be incorporated into Karellas, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references.

Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). As discussed above, it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a known pixelated readout amorphous selenium plate structure such as the pixelated readout amorphous selenium plate of Perez-Mendez.

Applicant argues (third paragraph on pg. 13 of remarks filed 24 January 2005) that the 10-50 micrometers photoconductive material thickness is not taught by the 2 micrometer thickness cited. Examiner respectfully disagrees. It should be noted that a prima facie case of obviousness exists where the claimed ranges and prior art ranges are close enough that one skilled in the art would have expected them to have the same properties. Takahashi *et al.* state (column 6, lines 20-24) that "It has been confirmed that so long as amorphous Se is used at the photoconductor film, the preferred range of the field intensity between the electrodes does not change irrespective of the film thickness". Thus Takahashi *et al.* expressly teach that the amorphous Se film thickness is not critical. Therefore the express disclosure that the amorphous Se film thickness is not critical in combination with the 2 micrometer thickness example provides a prima facie case that a 10-50 micrometers amorphous Se thickness would be obviousness to one of ordinary skill in the art.

Applicant argues (last paragraph on pg. 13 of remarks filed 24 January 2005) that there are many alternative characteristics that are more likely candidates for adjustment. Examiner respectfully disagrees. It is important to keep detector

characteristics as constant as possible in order that detector noise is not increased by random fluctuations of the detector characteristics. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a fluctuation suppressing means (*e.g.*, $S = f_A(L_E,E)$) in the system of Karellas, so that the image signal (S) is indicative of the stimulated emission (L_E) and thus representative of the image stored on the stimulable phosphor sheet.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SL

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